Stormwater Landscape Approaches for CSO Abatement/Control

Weftec conference 2004

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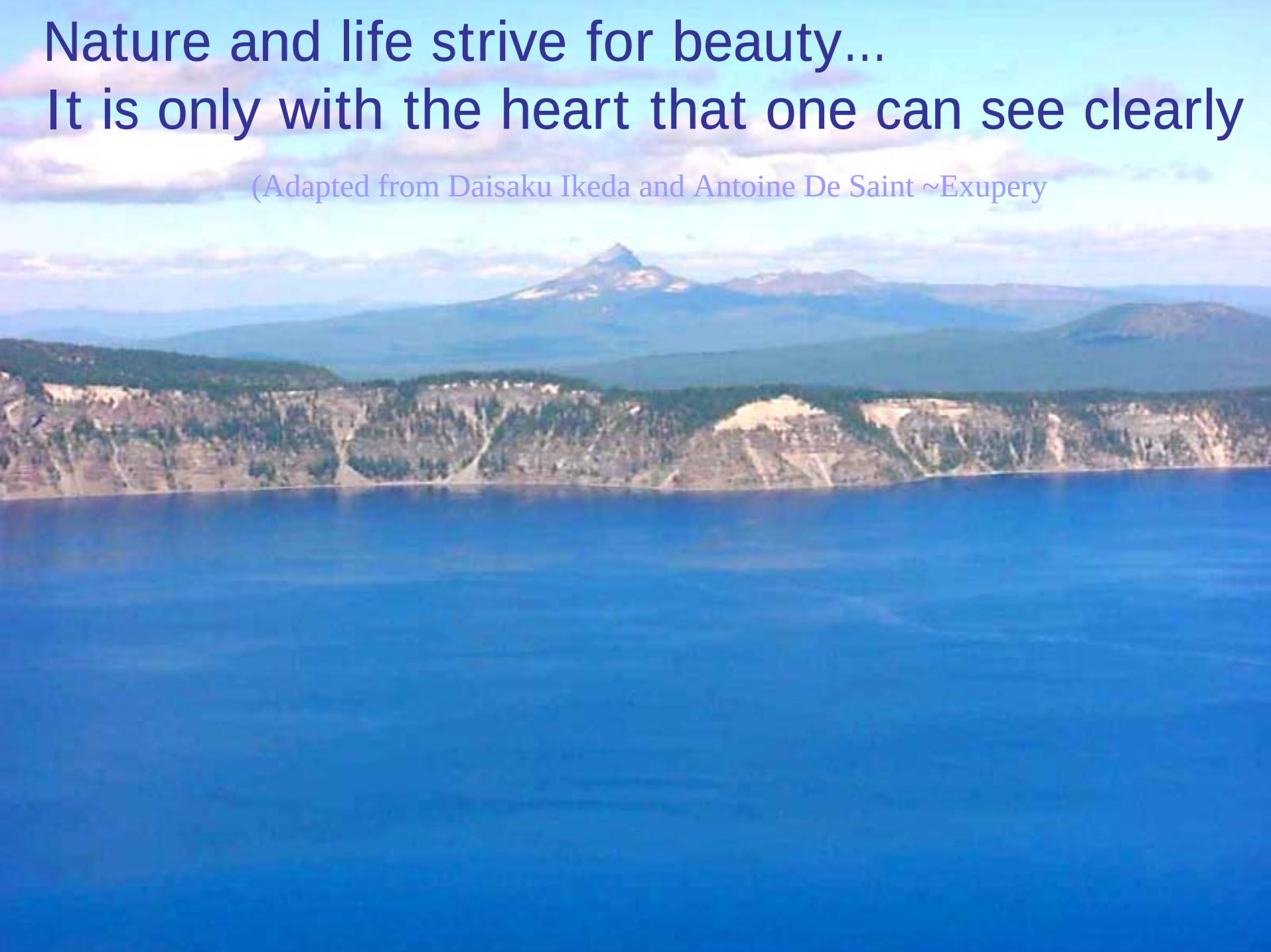
Nature and life strive for beauty...
It is only with the heart that one can see clearly

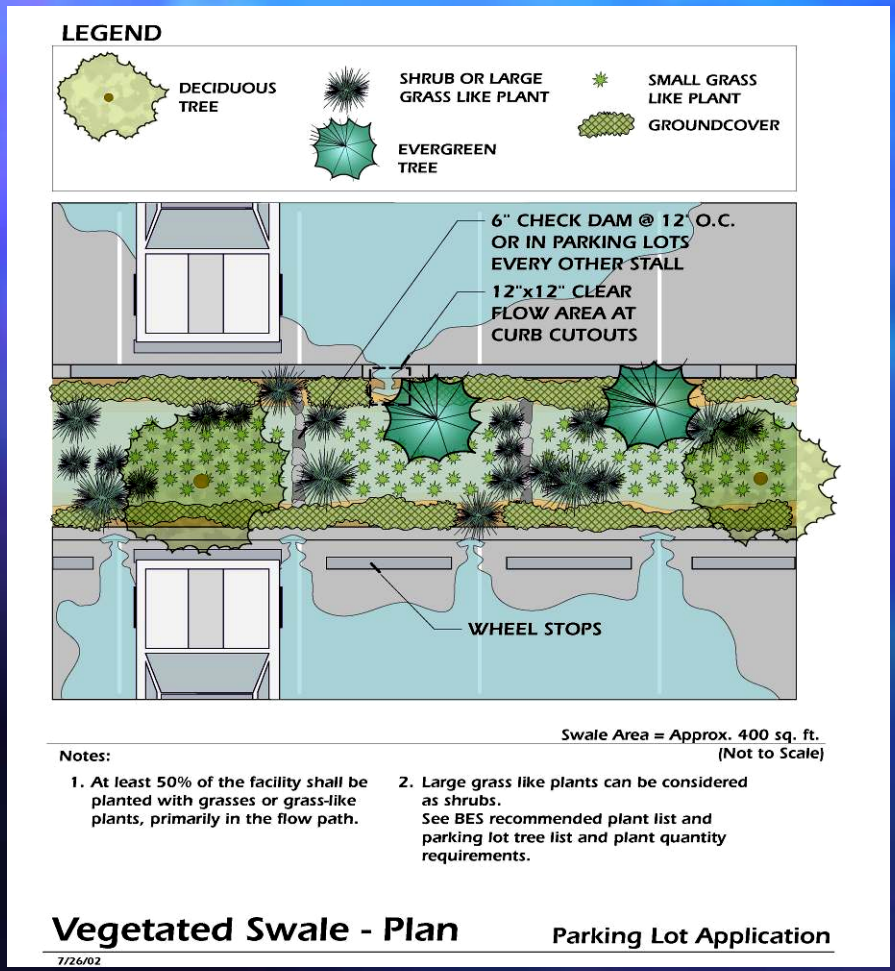
(Adapted from Daisaku Ikeda and Antoine De Saint ~Exupery

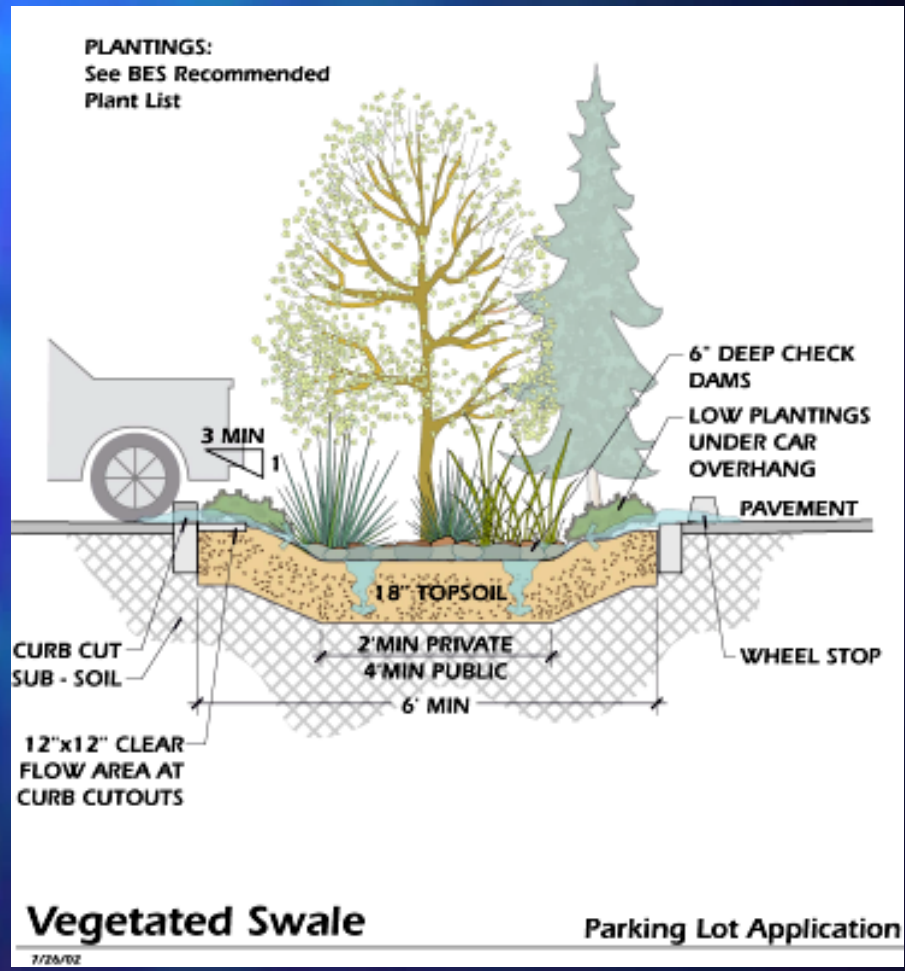



Conventional Rooftops – cause heat, glare, polluted runoff and have been found to harbor mosquitoes
APR 10 2001

Roof Sediment Discharge

Parking lots; new or retrofits
Landscape swales, infiltration gardens
flow through planters

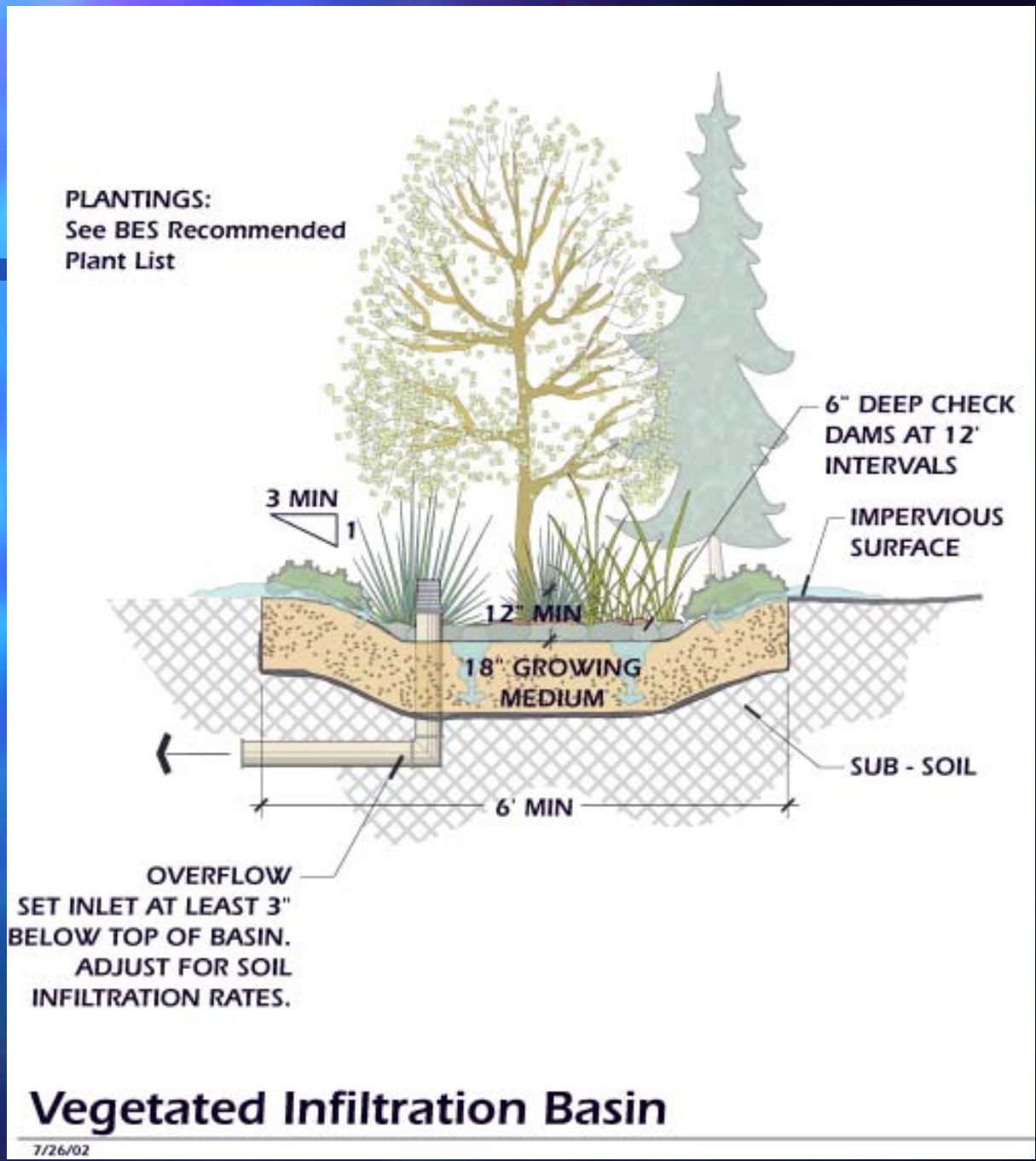




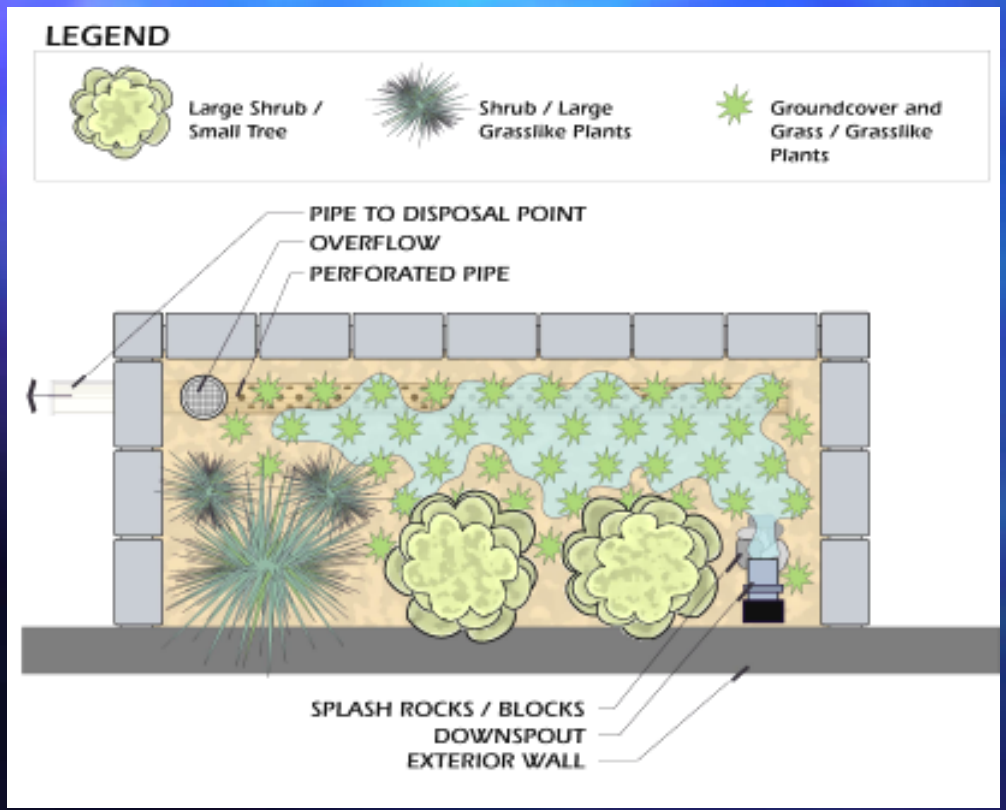
Landscape Approaches

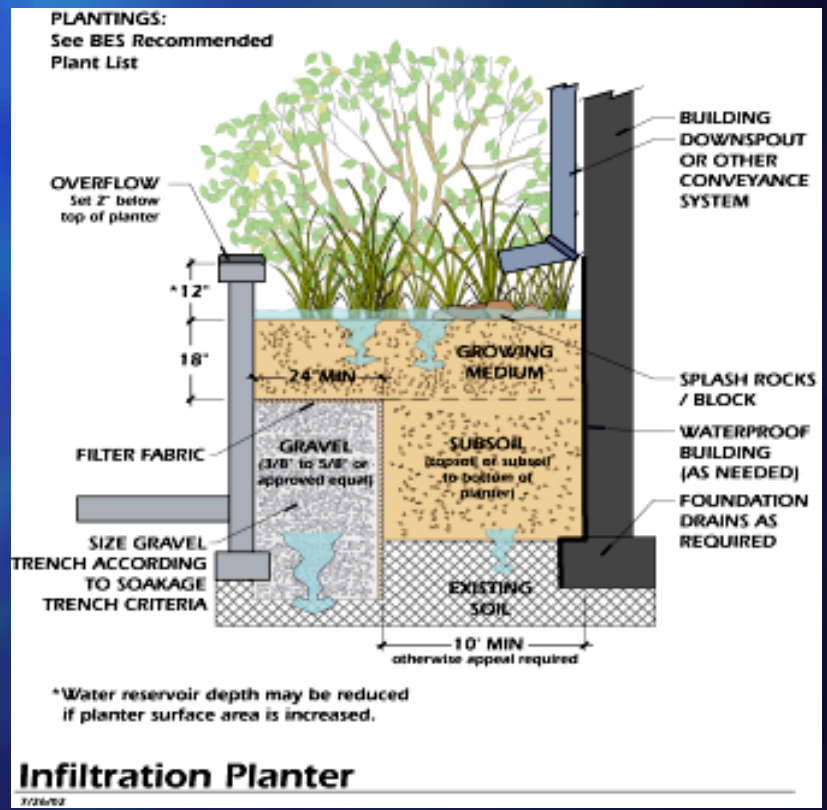
1. Remove and or prevent runoff into;
   - Combined Sewer System,
   - Receiving waters
   - Ms4;
   - Sewer Basement Backups,
2. Reduce infrastructure and O&M;
3. Improve neighborhoods and enhance livability.

Simplified Approach
Vegetated Infiltration

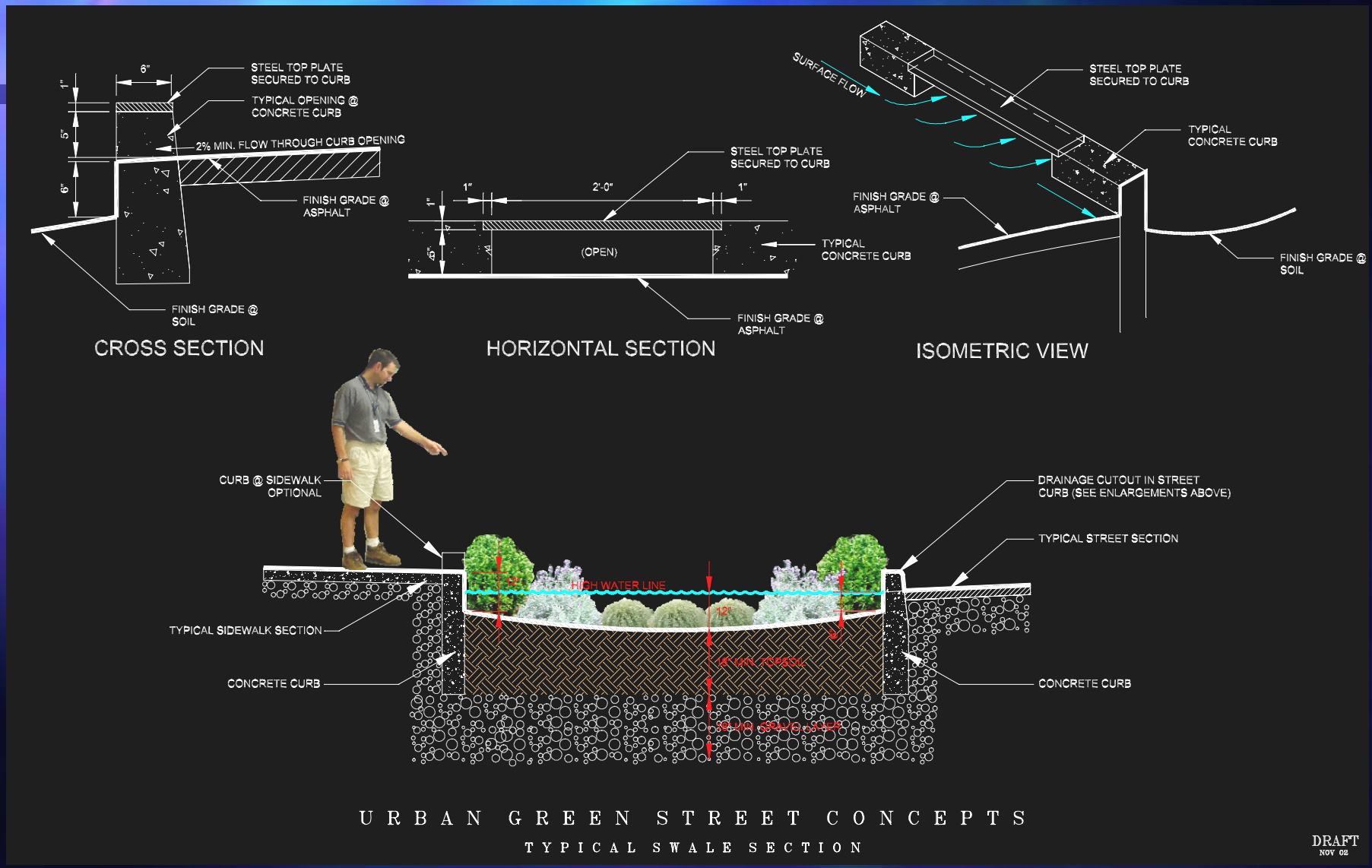


Using Landscape Techniques to filter, detain, retain, cool, use, re-use, prevent and infiltrate runoff



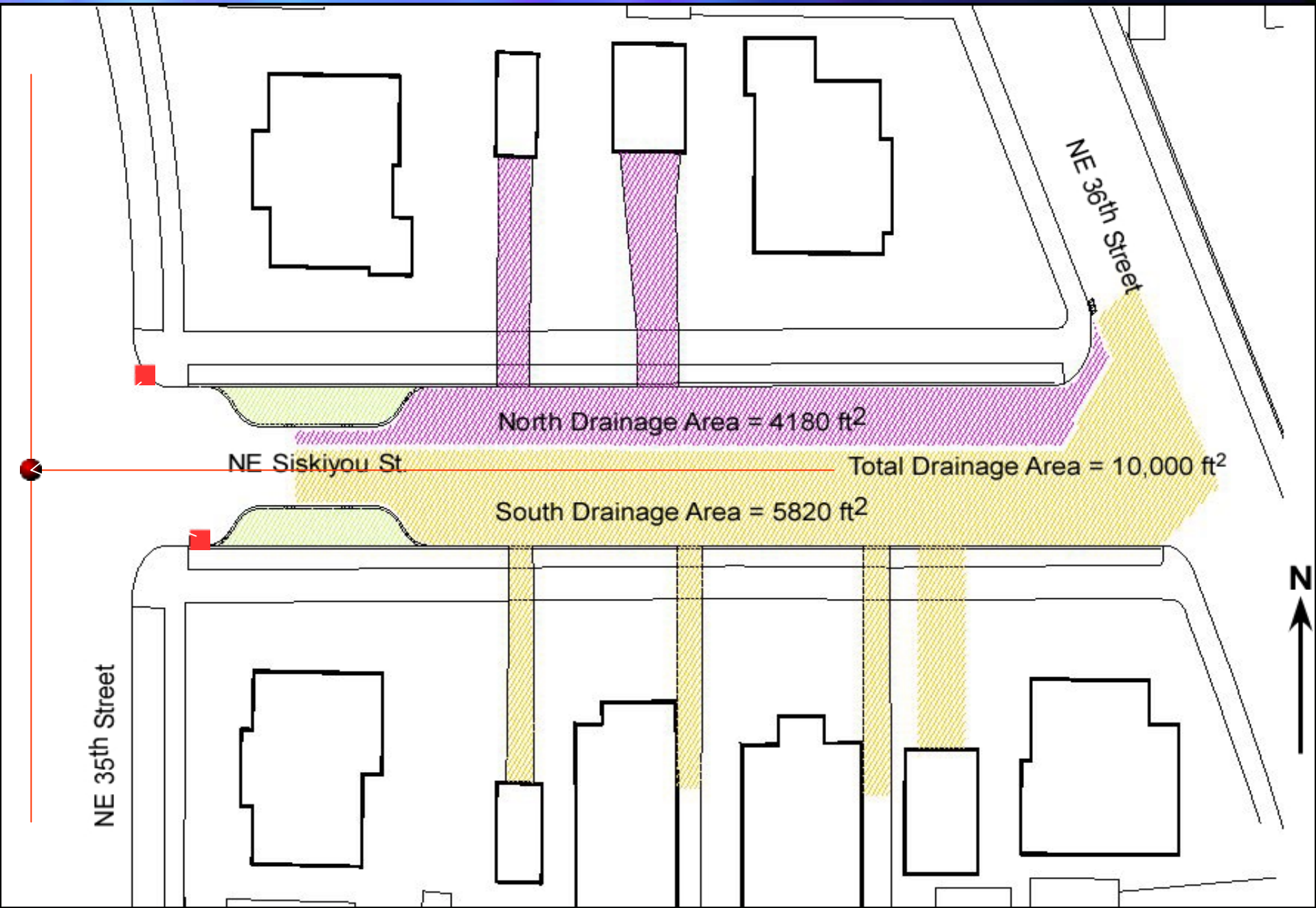


Green Street Design



Green Streets – Water quality friendly Vegetated Stormwater Planters

Siskiyou Street Drainage Area to Combined Sewer System




Winter rain


Winter rain
03.05.2004


2004 1 11


First spring
03.16.2004


First Summer 2004

Siskiyou Street Test data

- Drainage area = 5,800 sf street and driveways. Sidewalks drain into grass parkway strips.
- Facility surface area = 357 sf vegetated area.
- Simulated ASFO storm = 1.4 inches/45 min = 2,396 gal. in-flow; 364 gal. out-flow
- Facility performance = 85% ASFO storm retained.
- Basement backup storm peak reduction 88%

Division Street

Landscape Planters in sidewalk area take Street runoff. Commercial/Retail zone


Division Street Planters

New Season's Market

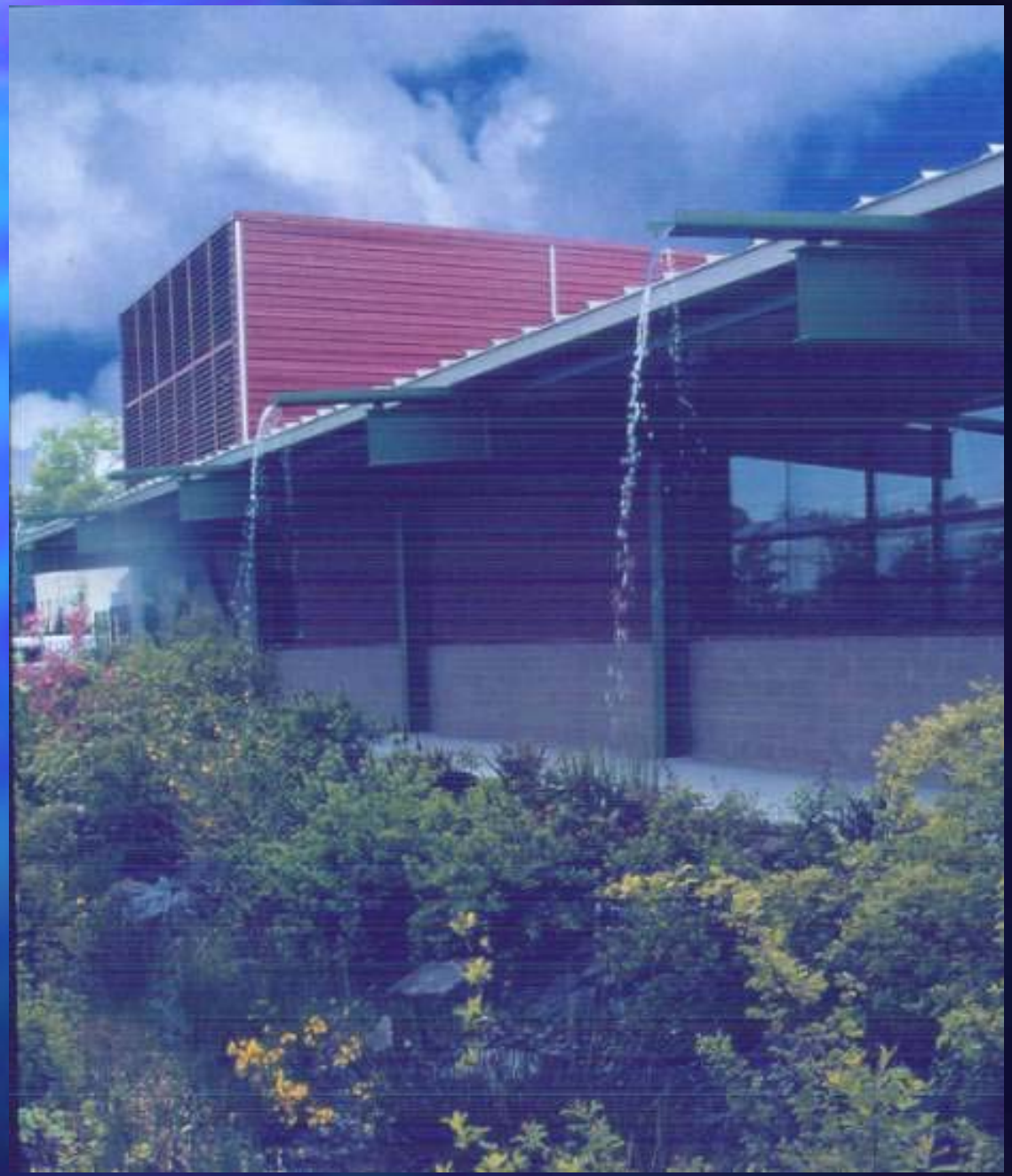

The friendliest store in

Buckman Heights Infiltration Gardens

Buckman Heights Apartments – Infiltration garden

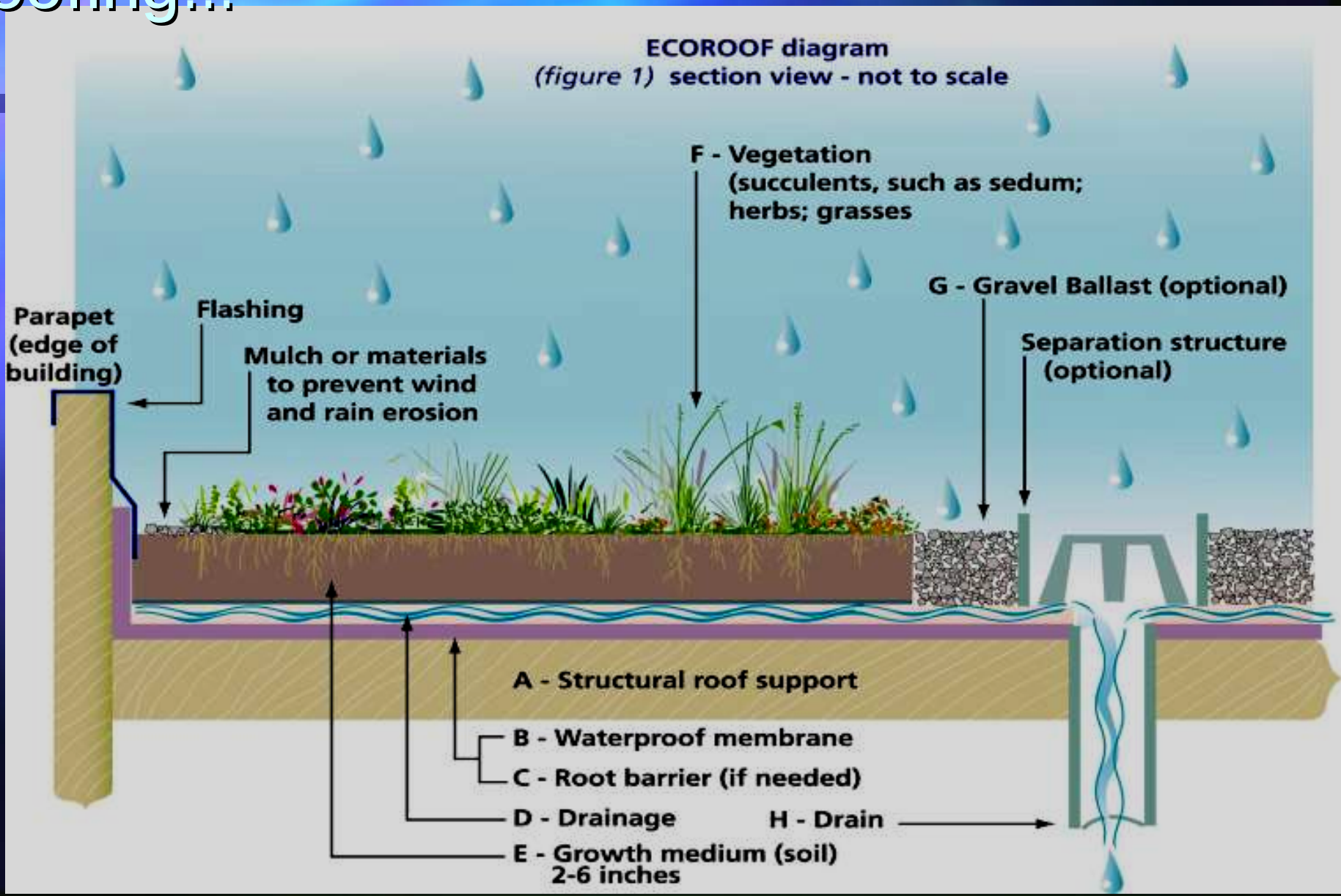
Buckman Terrace Apartments Stormwater Planters

Innovative ways to convey, manage and use stormwater



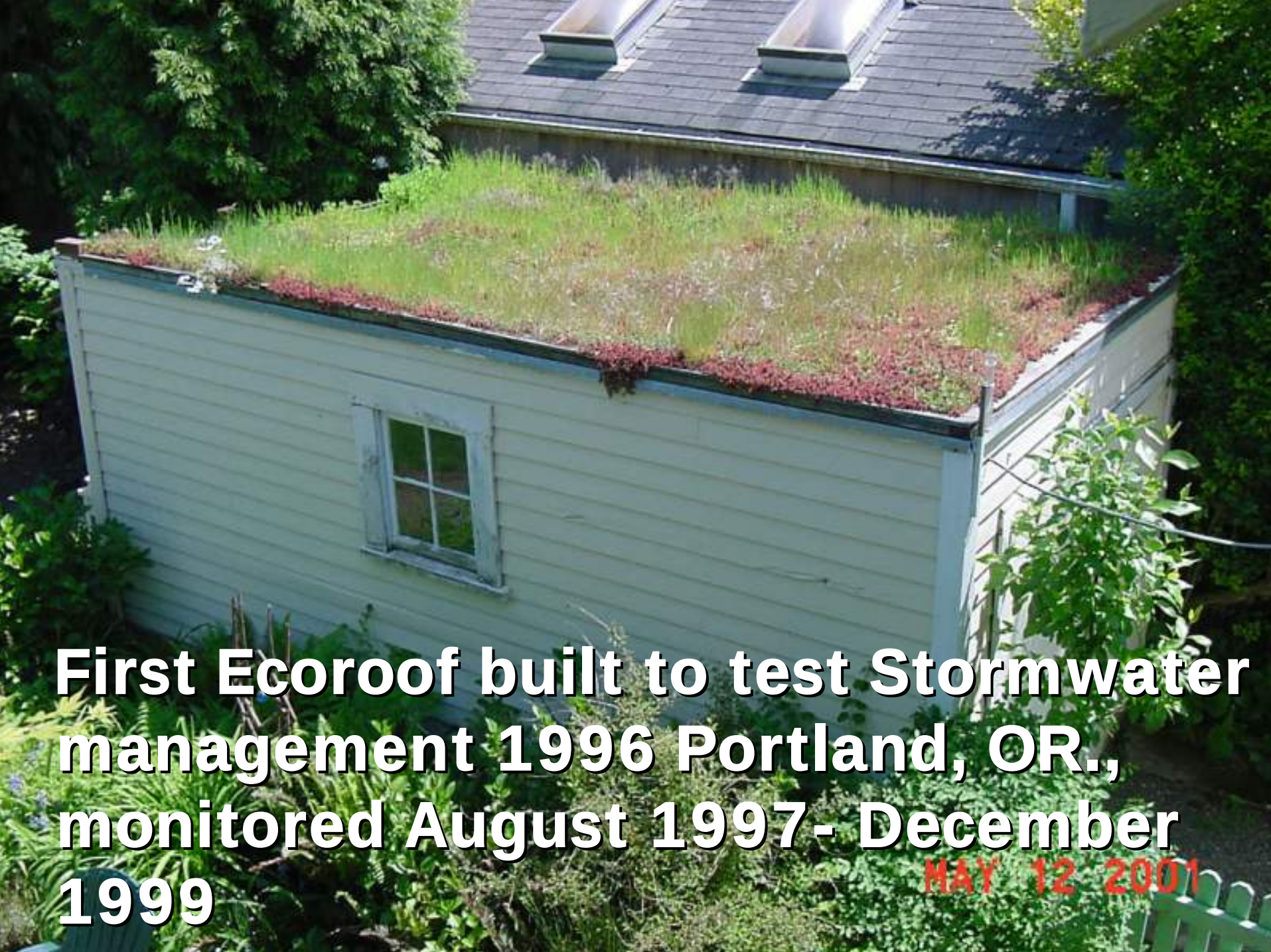
Davinci School Education Center

Ecoroofs...an alternative to conventional roofing...



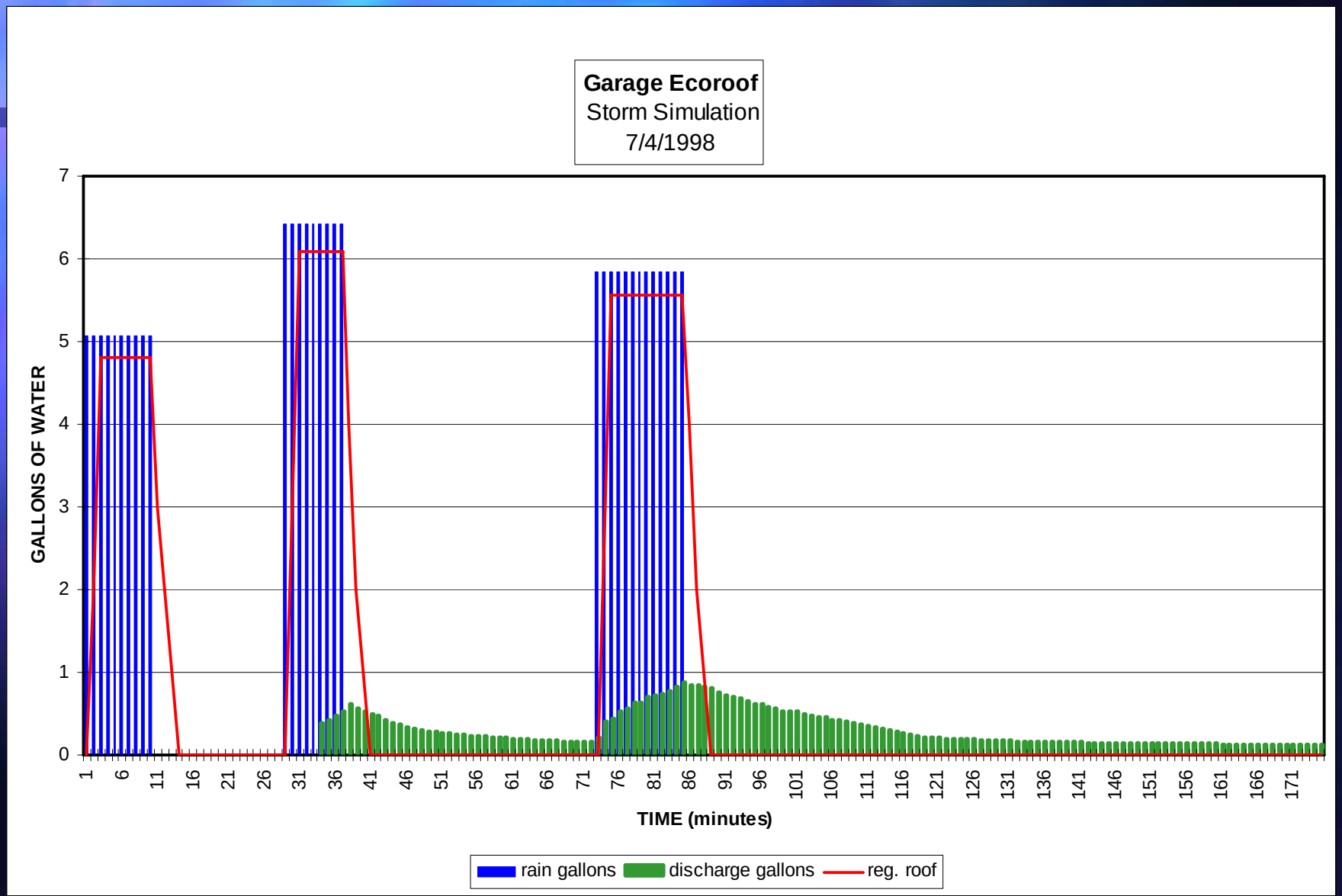
Ecoroofs

Brewery Block #4 Ecoroof 2003



First Ecoroof built to test Stormwater management 1996 Portland, OR., monitored August 1997- December 1999

Garage Ecoroof Storm Simulation 1998



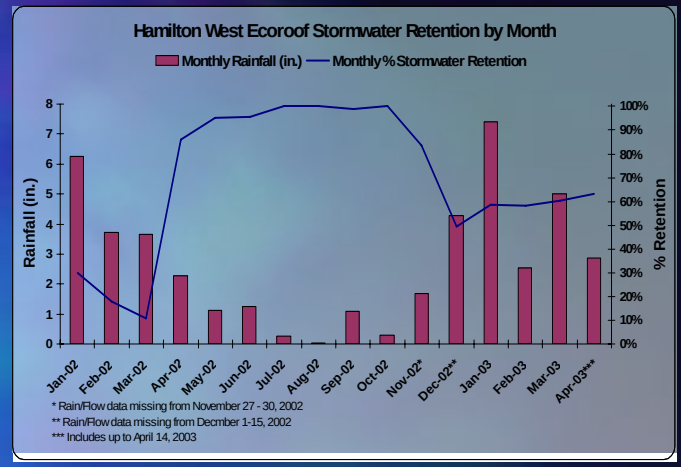
Hamilton Apartments Ecoroof - 1999

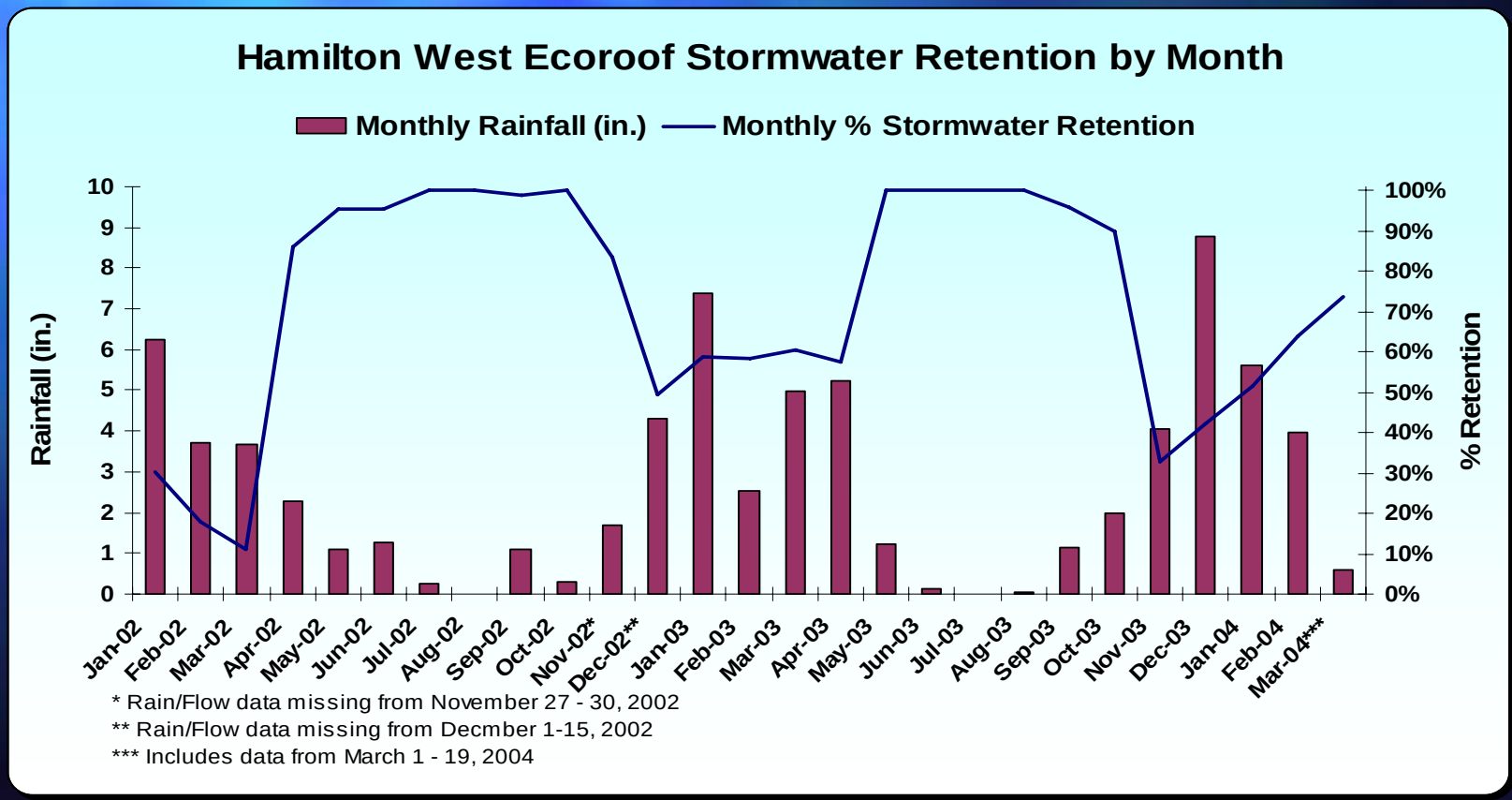
first large scale stormwater monitoring and education site in USA

STORMWATER RETENTION

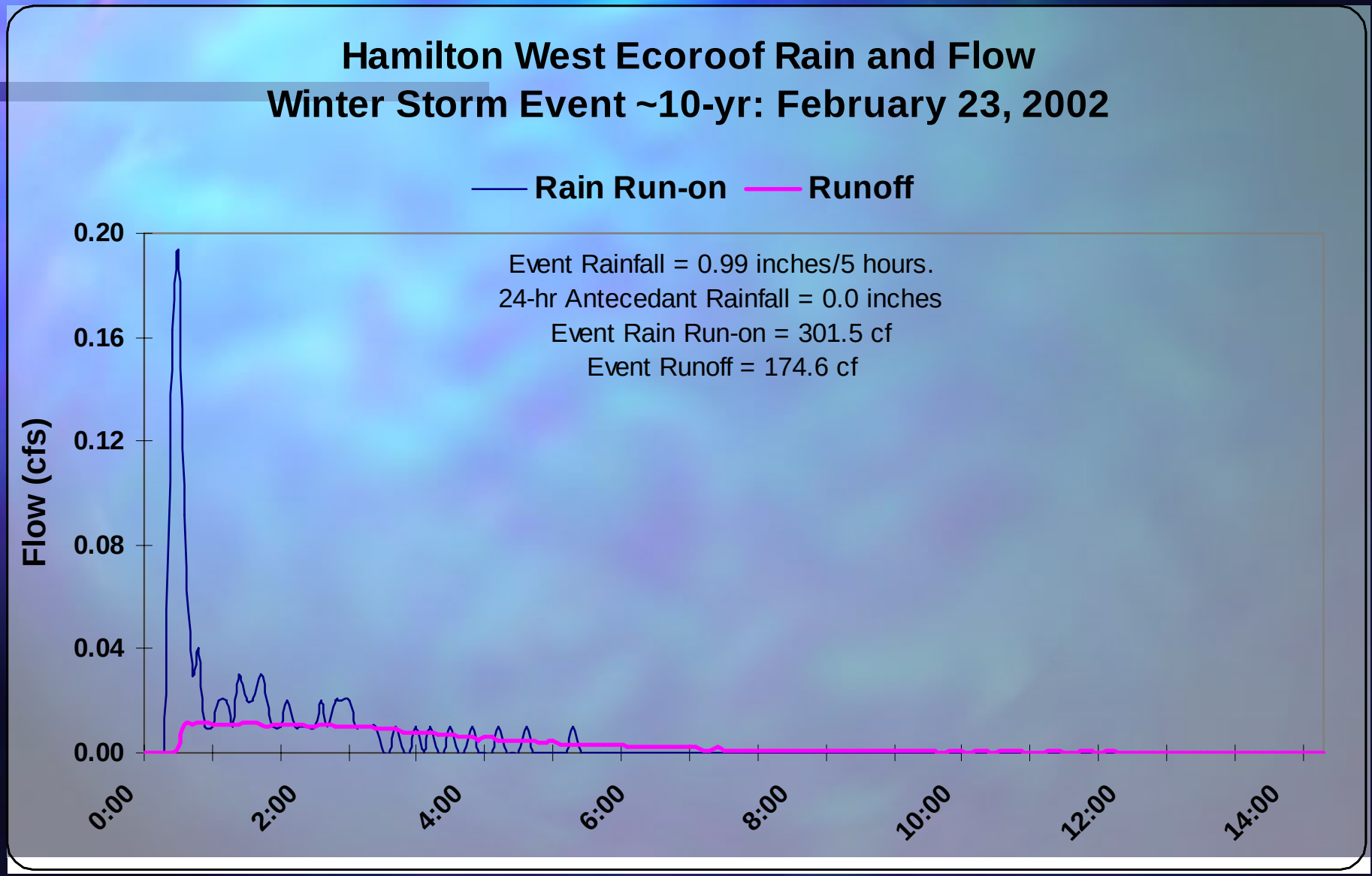
Jan. 2002 – April 2003:
Average monthly 69%
Average all precipitation for 16 months 52.5%

Jan. 2002 – March 2004:
Average monthly 71%
Average all precipitation for 27 months 53.5%

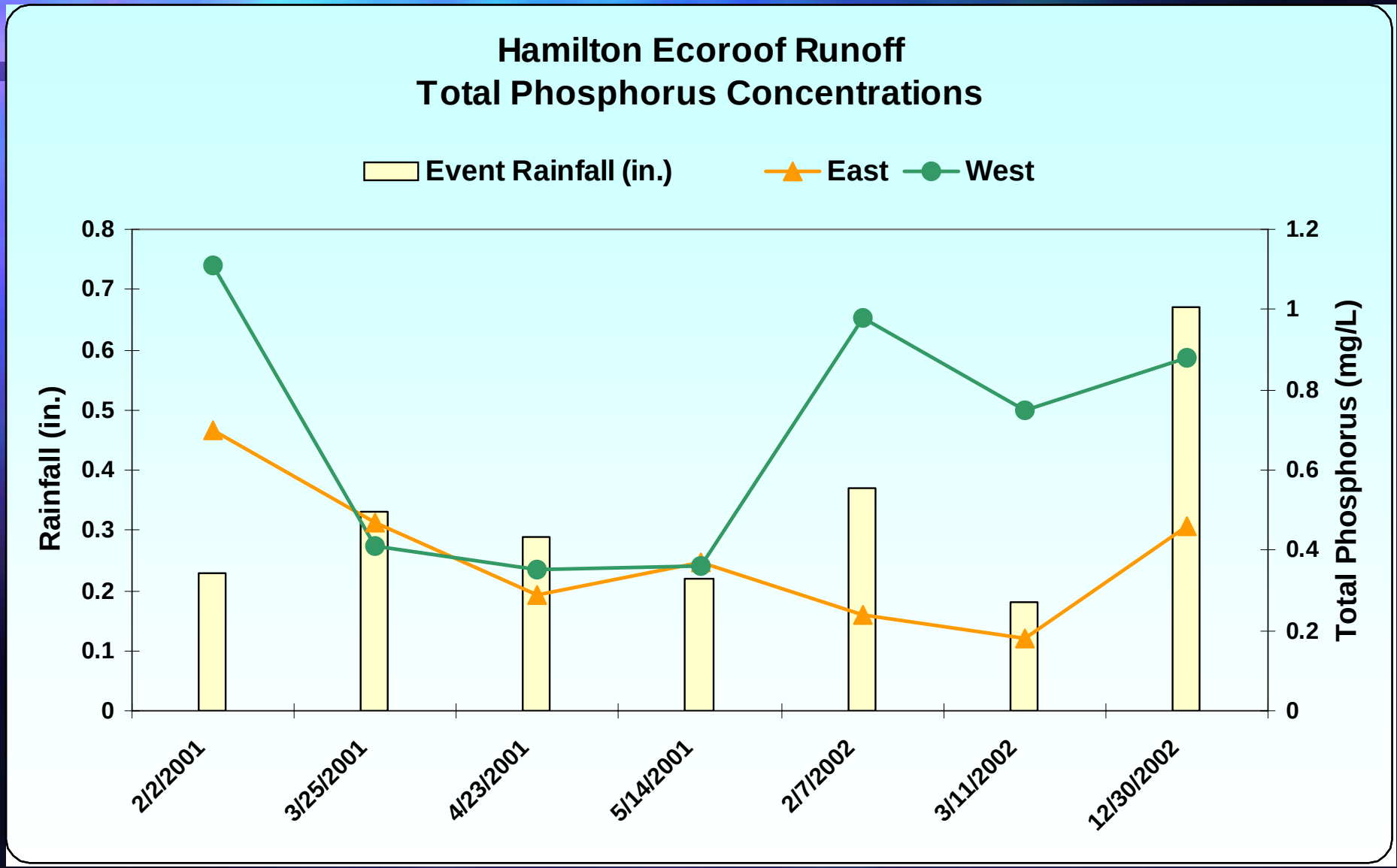




Westside Ecoroof Peak Intensity



Hamilton Ecoroofs Water Quality



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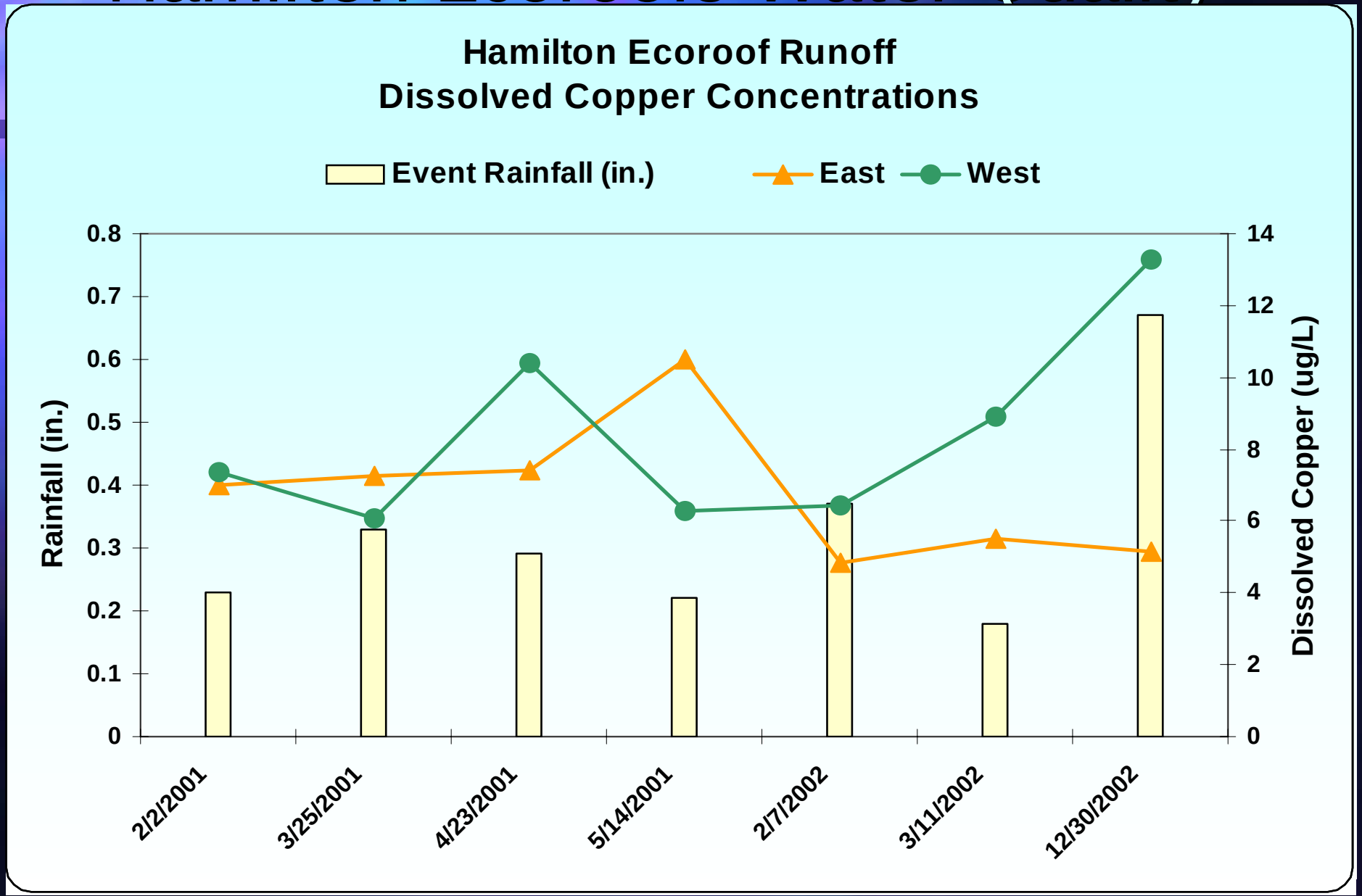

Ecoroof Monitoring Results

- Average rainfall retention over 27 month period = 53.5%
- Average monthly retention 71%.
- Based on characteristics of ASFO Storm it was estimated that ecoroofs comparable to Hamilton would retain 50% of the ASFO storm.